CLAIMS

What is claimed is:

1. A method for detecting a tilted disc, the method comprising:

positioning a pickup unit at a first predetermined location on an inner circumference of an optical disc;

radiating light on the optical disc at the first predetermined location;

moving the pickup unit away from the optical disc;

moving the pickup unit towards the optical disc;

measuring a time T1 at which a first focus error signal, generated when light is reflected from a recording layer of the optical disc, is output;

positioning the pickup at a second predetermined location on an outer circumference of the optical disc;

radiating light on the optical disc at the second predetermined location;

moving the pickup unit away from the optical disc;

moving the pickup unit towards the optical disc;

measuring a time T2 at which a second focus error signal, generated when light is reflected from the recording layer of the optical disc, is output;

determining a tilt degree indicating value T, using the measured times T1 and T2; and

comparing the tilt degree indicating value T with a predetermined reference value R to determine if the optical disc is the tilted disc.

2. The method of claim 1, wherein the time T1 is a time interval from a predetermined reference time to a time when the first focus error signal is output, and the time T2 is a time interval from the predetermined reference time to a time when the second focus error signal is output.

3. The method of claim 1, wherein the tilt degree indicating value T is obtained by the following equation:

$$T = |T2 - T1| .$$

4. The method of claim 1, wherein if the tilt degree indicating value T is greater than the predetermined reference value R, the optical disc is determined to be tilted.

5. The method of claim 1, wherein the optical disc is determined to be a positive tilted disc if the time T2 is greater than the time T1 and the optical disc is determined to be a negative tilted disc if the time T2 is less than the time T1.

6. A method for reproducing data recorded on a tilted optical disc, the method comprising restricting a maximum reproduction speed to a predetermined reproduction speed when data recorded on the optical disc is being reproduced.

7. The method of claim 6, wherein the predetermined reproduction speed is uniform regardless of a tilt degree of the optical disc.

8. The method of claim 6, wherein the predetermined reproduction speed is determined based upon the tilt degree indicating value T.

9. A method for reproducing data recorded on a tilted optical disc, the method comprising:

determining a tilt angle at a predetermined location of the optical disc where light is to be irradiated; and

compensating for the tilt angle of the optical disc by adjusting a pickup angle of the pickup unit to correspond to the tilt angle at the predetermined location of the optical disc.

10. A method of reproducing data recorded on a tilted optical disc, the method comprising:

positioning a pickup unit at a plurality of locations of an optical disc;

radiating light on..., the optical disc at each of the plurality of locations;

rotating the pickup unit through a plurality of pickup angles to detect a jitter signal that corresponds to each pickup angle;

determining the pickup angle at each of the plurality of locations at which a value of the jitter signal has a minimum value; and

when reproducing data, adjusting the pickup angle based upon a current location of the pickup unit and the pickup angle at which the smallest jitter signal was detected while proximate to the current location.

11. An apparatus for determining if an optical disc is a tilted disc, the apparatus comprising:

a pickup unit which,

radiates light on the optical disc,

receives light reflected from the optical disc, and

outputs an electrical signal corresponding to the amount of the reflected light;

a focus error signal generation unit which receives the electrical signal from the pickup unit and generates a focus error signal;

a pickup driving unit which controls the pickup unit; and

a control unit which,

measures a time T1 at which the focus error signal generation unit outputs a focus error signal generated when light is reflected from a recording layer of the optical disc by radiating light on a predetermined location on an inner circumference of the optical disc and moving the pickup unit towards the optical disc,

measures a time T2 when the focus error signal generation unit outputs a focus error signal generated when light is reflected from the recording layer of the optical disc by radiating light on a predetermined location on an outer circumference of the optical disc and moving the pickup unit towards the optical disc,

determines a tilt degree indicating value T to determine if the optical disc is tilted, using the measured times T1 and T2,

compares the tilt degree indicating value T with a predetermined reference value R, and

determines whether the optical disc is tilted.

12. The apparatus of claim 11, wherein the times T1 and T2 are time intervals from a predetermined reference time to a time when the corresponding focus error signals are output.

13. The apparatus of claim 11, wherein the control unit obtains the tilt degree indicating value T using the following equation:

$$T = |T2 - T1| .$$

14. The apparatus of claim 11, wherein if the tilt degree indicating value T is greater than the predetermined reference value R, the control unit determines that the optical disc is tilted.

15. The apparatus of claim 11, wherein the control unit determines that the optical disc is a positive tilted disc if the time T2 is greater than the time T1, and the control unit determines that the optical disc is a negative tilted disc, if the time T1 is greater than the time T2.

16. The apparatus of claim 11, wherein the control unit restricts a maximum reproduction speed to a predetermined reproduction speed.

17. The apparatus of claim 16, wherein the predetermined reproduction speed is uniform regardless of a tilt degree of the optical disc.

18. The apparatus of claim 16, wherein the predetermined reproduction speed is determined based on the tilt degree indicating value T.

19. The apparatus of claim 11,, wherein the control unit determines a tilt angle at a predetermined location of the optical disc on which light is to be irradiated, compensates for the tilt angle of the optical disc by adjusting a pickup angle of the pickup unit to correspond to the tilt angle at the predetermined location of the optical disc.

20. The apparatus of claim 19, wherein the control unit:

positions the pickup unit at a plurality of locations of the optical disc;

radiates light on the optical disc at each of the plurality of locations;

rotates the pickup unit through a plurality of pickup angles to detect a jitter signal that corresponds to each pickup angle;

determines the pickup angle at each of the plurality of locations at which a value of the jitter signal has a minimum value; and

when reproducing data, adjusts the pickup angle based upon a current location of the pickup unit and the pickup angle at which the smallest jitter signal was detected while proximate to the current location.

when the predetermined location on which light is to be irradiated is between an n-th location and a (n+1)-th location (where n is an integer greater than 1 and less than N), determines the tilt angle of the optical disc as the pickup angle of the pickup unit determined at the n-th location.

21. A computer readable medium on which a program for implementing a method for if an optical disc is tilted is recorded, wherein the method comprises:

positioning a pickup unit at a first predetermined location on an inner circumference of the optical disc;

radiating light on the optical disc at the first predetermined location;

moving the pickup unit away from the optical disc;

moving the pickup unit towards the optical disc;

measuring a time T1 at which a first focus error signal, generated when light is reflected from a recording layer of the optical disc, is output;

positioning the pickup at a second predetermined location on an outer circumference of the optical disc;

radiating light on the optical disc at the second predetermined location;

moving the pickup unit away from the optical disc;

moving the pickup unit towards the optical disc;

measuring a time T2 at which a second focus error signal, generated when light is reflected from the recording layer of the optical disc, is output;

determining a tilt degree indicating value T, using the measured times T1 and T2; and

comparing the tilt degree indicating value T with a predetermined reference value R to determine if the optical disc is tilted.

22. A method of determining if an optical disc is a tilted disc and reproducing data recorded on the optical disc, the method comprising:

positioning a pickup unit at a first predetermined location on an inner circumference of the optical disc;

radiating light on the optical disc at the first predetermined location;

moving the pickup unit away from the optical disc;

moving the pickup unit towards the optical disc;

measuring a time T1 at which a first focus error signal, generated when light

is reflected from a recording layer of the optical disc, is output;

positioning the pickup at a second predetermined location on an outer circumference of the optical disc;

radiating light on the optical disc at the second predetermined location;

moving the pickup unit away from the optical disc;

moving the pickup unit towards the optical disc;

measuring a time T2 at which a second focus error signal, generated when light is reflected from the recording layer of the optical disc, is output;

determining a tilt degree indicating value T, using the measured times T1 and T2; and

comparing the tilt degree indicating value T with a predetermined reference value R to determine if the optical disc is a tilted disc, and, if the disc is determined to be a tilted disc;

positioning a pickup unit at a plurality of locations of an optical disc;

radiating light on the optical disc at each of the plurality of locations;

rotating the pickup unit through a plurality of pickup angles to detect a jitter signal that corresponds to each pickup angle;

determining the pickup angle at each of the plurality of locations at which a value of the jitter signal has a minimum value; and

when reproducing data, adjusting the pickup angle based upon a current location of the pickup unit and the pickup angle at which the smallest jitter signal was detected while proximate to the current location.

23. A method of determining if an optical disc is a tilted disc and reproducing data recorded on the optical disc, the method comprising:

positioning a pickup unit at a first predetermined location on an inner circumference of an optical disc;

radiating light on the optical disc at the first predetermined location;

moving the pickup unit away from the optical disc;

moving the pickup unit towards the optical disc;

measuring a time T1 at which a first focus error signal, generated when light is reflected from a recording layer of the optical disc, is output;

positioning the pickup at a second predetermined location on an outer circumference of the optical disc;

radiating light on the optical disc at the second predetermined location;

moving the pickup unit away from the optical disc;

moving the pickup unit towards the optical disc;

measuring a time T2 at which a second focus error signal, generated when light is reflected from the recording layer of the optical disc, is output;

determining a tilt degree indicating value T, using the measured times T1 and T2; and

comparing the tilt degree indicating value T with a predetermined reference value R to determine if the optical disc is tilted; and

if the disc is determined to be a tilted disc, restricting a maximum reproduction speed to a predetermined reproduction speed when data recorded on the optical disc is being reproduced.

24. A method of determining if an optical disc is tilted, the method comprising:

recording a time T1 that a pickup unit takes to focus on an optical disc recording surface at a first position;

recording a time T2 that the pickup unit takes to focus on the optical disc recording surface at a second position; and

using the times T1 and T2 to determine if the optical disc is a tilted optical disc.